

MUGAST MUst2 - GASpard - Trace

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GHT workshop, IPN Orsay, Jan 23-24,2017

MUGAST MUst2 - Gaspard - Trace

New detectors + MUST2 electronics for high resolution reaction studies



- New packaging: thin frame Kapton at 90°
- > NTD, random cut, rev. mount
- > Thin and thick





CONFIGURATION

- Backward angles
 5 trapez. + annular
- ~90 deg.2 squared
- ForwardMust2 telescopes

AGATA efficiency ($E_{\gamma} = 1.3 \text{ MeV}$)

	2014/2015 (24 caps)	Now (32 caps)	2019 (45 caps)
D = 23.5cm	4%	5.3%	7.5%
D = 18cm		8.5%	13%



MUGAST assembly cut view



MUGAST HARDWARE

ITEM	STATUS	who	
DETECTORS			
Trapezoids proto (x2)	Commissioning	IPNO	
Trapezoids pre-serie (x3)	Ordered	Surrey + IPNO + Santiago	
Squared proto (x2) + Thick proto	Ordered	INFN Padova	
Annular (x1) th = 500 um	Available		
MUST2 (x4)	Available		
ELECTRONICS			
MUST2 FEE new boards (x7 pairs) (boards+components)	ordered	IPNO	
ASICs (for 7 pairs)	ordered	IPNO/CEA	
Test kaptons	Available	IPNO	
Kaptons (serie)			
Cables & feedthroughs			
MECHANICS			
Chamber	Ordered (75%)	Surrey	
Cooling blocks			
Helium cryogenic target			

Physics with MUGAST

2 dedicated workshops organized at Orsay and Padova

0	Mapping of neutron orbitals around N=28	F.Flavigny, O.Sorlin et al.
0	Oblate driving force in n-deficient nuclei above ⁵⁶ Ni	A.Goasduff, D.Mengoni, et al.
0	Shape transition along and across N=28	L.Fortunato, D.Mengoni et al.
0	Interplay of single-part and collective structures in ⁴⁶ Ca	S.Leoni et al.
0	Shell evolution toward the island of inversion	A.Matta, W.Catford, N.Orr, et al.
0	Shape coexistence in Kr isotopes	A.Matta, W.Catford, et al.
0	Island of Inversion and shape coexistence in ^{30,31} Mg	B.Fernandez-Dominguez et al.
Neu	utron-proton pairing	

- o np-pairing in fp-shell
- > Astrophysics
 - Breakout from hot CNO to rp process
 - Explosive H-burning in Novae
 - Surrogate method for s-process reactions
 - o ⁶⁰Fe
- Reaction dynamics
 - Space-time characterization of emitting sources in HI collisions

N.de Sereville, F.Hammache et al. G.de Angelis et al. A.Matta, W.Catford, et al.

G. Verde, A.Chbihi, Q.Fable et al

Mostly stripping reactions

Shell evolution & deformation

M. Assie et al.

C.Diget et al.

MUGAST-AGATA-VAMOS Lol's

2015

Single LoI submitted including a list of reactions

PAC comments:

The PAC found the proposition of combining MUGAST+AGATA with VAMOS compelling, and it was clear that much progress had already been made in realising this ambition, with significant development of the instrumentation. The aim to deliver a campaign around transfer reactions (including stripping) was well received as it was believed that this should be a core component of the future scientific programme of GANIL, building on the rich heritage of the programme that the present collaboration has led. The PAC is therefore supportive of this development and it would seem that the best course of action is to present this proposition to the GANIL Scientific Council as directed by the GANIL Director.

2016

"Umbrella" LoI + 7 Physics LoI's submitted including

PAC comments:

Summary

The science programme described by the LoIs was strong. In particular the PAC recognises the opportunity that the combination of MUGAST, VAMOS and AGATA presents and it suggests that this programme be made a priority for future calls for proposals.

2017

Call for proposals with spiral1 beams ??

Towards a new MUGAST Configuration

- > To be used at LISE , HIE-Isolde ?, ... for stripping reactions
- ➤ ≥ TIARA-MUST2 4xEXOGAMs (cube geom.)
 - Better efficiency & Doppler correction
 - Better PID _____ 2 layers, PSA?
 - No barrel
- ➢ GASPARD-TRACE detectors + MUST2 elec ("deported")
- No AGATA
 EXOGAM or others
 more compact
- Available soon, if possible...

System currently available



EXOGAM

2 configurations with 16 detectors : with(B) or w/o(A) side shield





	Photopeak efficiency (%)		Peak-to-total (%)		D _{target} (mm)
	662 keV	1.3 MeV	662 keV	1.3 MeV	
EXOGAM configuration A ^a	28	20	57	47	115
EXOGAM configuration B ^b	17	12	72	60	150
Gamma-Cube ^c	15	10	72	60	68

(GEANT calc.)

Example of solution using trapez. detectors (Conceptual design)



Issues

- PID of recoil particle
 - Need good TOF for low E particles (No PSD)
 - Need second stage (thick Si)
 - Funds and delay ?
 - Technical issues
- Electronics integration
- Mechanical support
- Solid target system
- Losses due to interstrip
- > Number of EXOGAM's available
- ➢ Helium target ?
- Tritium target ?

SETUP at ISOLDE

T-REX + MINIBALL

Miniball collaboration Munich Leuven





- Which compact configuration can we propose (Efficiency of miniball, PID, etc...) ?
- Timeline : after shutdown (end of 2020)